CORE
Metadata, citation and similar papers at core.ac.uk
Provided by Southern Methodist University

Journal of Air Law and Commerce

Volume 26 | Issue 2 Article 2

1959

International Route Air Navigation Facilities and Services - Its Financial Aspects From a Canadian Point of View

A. Jaworski

Follow this and additional works at: https://scholar.smu.edu/jalc

Recommended Citation

A. Jaworski, *International Route Air Navigation Facilities and Services - Its Financial Aspects From a Canadian Point of View*, 26 J. Air L. & Com. 137 (1959)
https://scholar.smu.edu/jalc/vol26/iss2/2

This Article is brought to you for free and open access by the Law Journals at SMU Scholar. It has been accepted for inclusion in Journal of Air Law and Commerce by an authorized administrator of SMU Scholar. For more information, please visit http://digitalrepository.smu.edu.

INTERNATIONAL ROUTE AIR NAVIGATION FACILITIES AND SERVICES—ITS FINANCIAL ASPECTS FROM A CANADIAN POINT OF VIEW

BY A. JAWORSKI, Economist
Economic Policy Division, Department of Transport—Canada

INTRODUCTION

IN November 1958, the Council of the International Civil Aviation Organization (ICAO) practically endorsed all eight recommendations of the International Conference on Route Charges, which discussed the problem with the delegates from 27 countries for almost two weeks at Montreal (18 March-1 April, 1958). In turn the Conference had based its discussions on a detailed report that was prepared by the ICAO Air Transport Committee acting under the direction of the Council. This report was issued in May 1956 after several years of study, following the ICAO First Assembly's resolution in 1947.

It seems worth while, therefore, to summarize briefly the financial order of magnitude of the problem, and its relationship to the international air transport in general, and to the leading countries in civil aviation like the United States, in particular.

It should be added that in November 1956 a similar conference was held in Montreal on charges at international airports. As these two subjects: the airport- and route charges are closely related, the 1956 discussion was of a great assistance to the Route Charges Conference in March 1958."

The paper falls into two parts; Part I summarizes the statistical data submitted to the Conference and the Conference's Final Report, whereas Part II contains personal afterthoughts and suggestions about a "clearing house" between governments as a means of solving the problems of payments for international route facilities.

PART I

Definition of Terms

Broadly speaking, all outside assistance to the airlines' operation that is not shown in their financial statement comes under two main headings: (a) airports' facilities, and (b) route facilities. The distinction between these two is defined by the use to be made of the service. Any facility used when the aircraft is on the ground, or in connection with a landing or take-off, is regarded as an airport activity. Conversely, any use of an outside facility or a service in flight is regarded as a route activity. Admittedly, there are instances where the same facility or service—depending on the manner in which it is used—can be considered as both an airport and a route activity. For example, if a control tower is calling a landing aircraft, and simultaneously provides information to another aircraft which is overflying the airport, the control tower is then engaged in both airport- and route-activities. Similarly, meteorological information about the ground condition, as it refers only to take-off or landings, should be classified as an airport activity, whereas all meteorological services that refer to a flight (after take-off and before landing), is to be considered as a route facility,

even when such service was provided on the ground to the pilots during a briefing. The classification is of more than academic interest because, in practice, the cost of the facilities and the charges, if they are related to cost, depend directly on the classification. But, the allocation of costs in these instances must be arbitrary; for example, the operating cost of a control tower may be spread equally between an airport and a route service.

The air navigational facilities have been sub-divided into seven groups, defined as follows:

1. *Communication Facilities.* Includes both ground-to-air communication en route, and ground-to-ground, when these are used directly or indirectly in connection with flight. Communications which are used for approach or aerodrome control, however, are considered as an airport facility.

2. *Navigational Aids.* These include all ground radio and visual aids to navigation en route.

3. *Air Traffic Service.* Covers information en route only, i.e. excluding traffic service provided during take-off or landing which is considered as an airport facility.

4. *Meteorological Services.* Meteorological Services include all service which is rendered directly, or indirectly, e.g. during crew's briefing, in connection with flight. It encompasses the services of ocean weather stations, but excludes information pertaining to met. conditions for take-off or landing.

5. *Emergency Landing Grounds.* These include any emergency landing ground provided specially for international civil aviation as a requirement in a Regional Plan. It may be noted that there are at present eight ICAO Regions: Middle-East; European-Mediterranean; North-Atlantic; Caribbean; South-East Asia; African-Indian Ocean; South-America-South Atlantic; and Pacific. It is characteristic for the regions' boundiaries that most of them overlap.

6. *Search and Rescue Service.* These include any permanent establishment of equipment and personnel for Search and Rescue purposes but excludes the additional resources utilized on particular Search and Rescue missions.

7. *Miscellaneous Services.* These include any permanent establishment of equipment and personnel maintained for the purposes of providing aeronautical charts and information services.

Financial Order of Magnitude

The global financial estimates by the ICAO Airport Committee on the navigational and airports' facilities and their relationship to the airlines' international operation, have been published by the Committee on different occasions and are grouped below for convenience in a tabular form.

WORLD'S INTERNATIONAL AIR TRANSPORT COSTS AND REVENUES
1956
(In Millions of Dollars)

	Total Costs	*Revenues*	*Net Cost (Total Costs-Revenues)*
Airlines	1,236	1,200	36
Facilities	179	90	89
a. Airports	116	85	31
b. Route Navigation	63	(5)*	58

* See Text.

Canada's share of the world's totals is apparent from the table below.

CANADA'S INTERNATIONAL AIR TRANSPORT COSTS AND REVENUES
1956

	Total Cost		*Revenues*		*Net Cost (or Profit After Income Tax)*	
	Millions of Dollars	*Percent of World*	*Millions of Dollars*	*Percent of World*	*Millions of Dollars*	*Percent of World*
Airlines (TCA & CPAL)	41.89	3.4	42.64	3.6	(.75)	N.A.
Facilities	16.30	9.1	4.47	5.0	11.85	13.3
a. Airports	7.84	6.8	2.95	3.5	4.89	15.8
b. Route Navigation	8.46	13.4	1.52	30.4	6.94	12.0

It must be strongly emphasized that the above figures—in particular the global ones—are merely an indication of the order of magnitude and are based upon much estimating and arbitrary allocation. A large proportion of the airports' revenues and practically all the routes' revenues stem from the airlines' payments and, therefore, are hidden in their costs. And, if in some instances the airlines themselves provide the airport or navigational facilities, such expenses are reflected in their total cost, too. In short, for the international air transport industry as a whole; both the airlines and the facilities, the grand total cost would equal the airlines' cost plus the net cost of the facilities, as the latter is not borne by the airlines. Thus the total figure for international air transport in 1956 would be of the order of $1,325,000,000.

It is interesting to note that in the global cost of $63 million for route navigation, over one-third is accounted for by meteorological facilities; $15 million represents the aviation allocation of the jointly financed ocean station vessels in the North-Atlantic, and about $10 million for the territorial met. expenses.

In the ICAO's estimates for the international routes, the revenue of $5 million, as indicated in our table, is not shown directly; when we add the individual statements from the contracting states, we end up with a figure of $3.55 million (see Table 2 for details), and this figure we have extrapolated to $5 million to account for the revenues from the ICAO members which did not furnish their statements. In some of these countries, the airlines themselves operate the navigational facilities directly or through a non-profit organization jointly established by them, and usually approved by the states concerned.

Regarding the relative cost of airports and route navigation facilities, we may conclude from the table that although the gross costs of international airports are almost twice as high as those of the route facilities, the reverse is true for the net cost.

From the airlines' global figures for 1956—as estimated by ICAO—an operating deficit is apparent which, of course, implies that no additional charges could be absorbed on a global scale, without a corresponding rise in the deficit.

For 1957, the financial picture looks slightly brighter as a marginal profit of about one per cent of airlines' revenues was quoted at the Conference. The routes' net cost, however, is of the order of 5 per cent of the airlines' revenues, thus the 1957 global profit appears to be quite insufficient to meet the navigational expenses. But, in Part II of our analysis, if we turn from the global figures to the individual countries, it appears that even their 1956 operating profit was ample enough to meet the appropriate share of the navigational net costs (see Table 4a).

To relate Canada's data to the ICAO's global estimate, it was also necessary to make several assumptions. First, for the international operations of the principal Canadian carriers, namely Trans-Canada Airlines and Canadian Pacific Airlines, only the international traffic is shown separately and, therefore, the companies' total revenues and expenses have to be allocated arbitrarily to the international operations; this was done on the basis of available ton-miles flown.

Similarly, the yearly cost of the international route navigation of $8.46 million is much higher than the figure of $5.15 million shown in the working paper of the Conference (see Table 1 below) to account for several expenses omitted in Table 1. For example, the following allocated costs to the navigational facilities should be added: the trans-border traffic with the United States which we estimated of the order of $2 million; Canada's share of maintaining weather vessels of $.84 million; a $73,000 contribution to the joint financing arrangements with Denmark and Iceland; and finally a share of about $76,000 of Canada's contribution to the ICAO (Canada's yearly contribution to ICAO is about $128,000, which was sub-divided between airports and route navigational facilities in proportion to their costs).

It was estmated by ICAO that for the yearly global cost of route navigation of $63 million, about $18 million, i.e. about 29 per cent should be allocated to the North-Atlantic route. And in Canada's cost of international routes, the North-Atlantic share is even more predominant, as it accounts for over 70 per cent. As a matter of interest, it should be pointed out that according to ICAO calculations,[1] in 1957 the share of the Canadian carriers in the total number of crossings of the North-Atlantic, amounted only to 3.76 per cent, and this is confirmed by the fact that in Gander in 1956 the proportion of landings by Canadian carriers was less than 2 per cent. Bearing in mind that the North-Atlantic route plays such an important part in the International facilities provided by Canada, and that the North Atlantic route is definitely the most important route in international transport, it is rather disturbing that Canada's share in the global net cost is as high as 12 per cent, whereas in the airlines' global revenues, only 3.4 per cent. However questionable some of the statistical data may be, the unpleasant conclusion based thereon would continue, even if further statistical refinement were attempted.

International Route Charges in Canada

In 1950 two types of international route charges were introduced in this country:

(i) A landing fee with a combined route charge on all North-Atlantic and Caribbean flights calling on any of the Canadian airports. The charge came into effect on January 1st, 1950, and the rates have remained unchanged since that date.

(ii) A telecommunication charge on all trans-oceanic flights calling on any of the Canadian control towers. The charge was introduced on November 1st, 1950, with an increase in the rates, effective April 1st, 1958.

The combined route and airport charge is related to the aircraft gross weight, but it climbs slightly faster than the weight; for a DC-6 of 93,200 lbs. gross weight, the charge is $127, while for an aircraft with a gross weight twice as high, the charge increases to $277.75.

As a rough approximation, we may say that one-half of the charge reflects the airport's cost, whereas the other half is a contribution to the costs of navigational facilities.

[1] Charges for International Route Air Navigation Facilities and Services (ICAO Doc.) (1956).

Although the collection of charges during landings is a very simple procedure, the obvious disadvantage of this method appears on overflights. In such instances, charges are not collected, despite the fact that the route facilities are used almost to the same extent, and the airports' costs do not decrease proportionally.

To be specific, during the last fiscal year, the landing fees at Gander have decreased due to overflights by more than $400,000 from the previous year. This accounts for a substantial operating deficit before depreciation, against a surplus for the previous year for which figures are shown in the Working Papers of the Conference.[2] The trend of overflying Gander is likely to continue, as pointed out by The Economist: "Once a non-stop crossing has been shown to be technically feasible and is commercially offered, there can be no going back on it."[3]

The telecommunication charge is a flat charge; $20/flight irrespective of the aircraft's gross weight, or the number of messages (contacts) during one flight. (Up to April 1st, 1958, the charge was $13/flight.)

This charge is intended to recover part of the telecommunication cost for voice transmission, whereas the navigational charge combined with the landing fee reflects the cost of control towers and the operational cost of automatic devices such as Loran stations, and radio beacons.

The special position of Gander- and Shannon- Airports was recognized by the Conference. The fact of over-flying is recorded in para 56 of the Final Report, with the following statement: ". . . the representatives of Canada and Ireland indicated that if problems of this kind became more serious for their governments in future, they foresaw that more special charging arrangements might have to be made."[4]

It may be added that effective August 1, 1959 the North-Atlantic route charges will be separated in Canada from the landing fees by introducing a $64 charge per flight and decreasing the landing fees by the same amount. It has been figured out that such change in method of paying for the navigational services will counterbalance the financial deterioration of about $1,140,000 during the fiscal year 1957/58 relatively to the previous year, due to rising of costs and losses of revenues on over-flights. (Canada's net cost shown in Table 1 practically will remain the same after such a change in method of payment, as its main object was to restore the losses to the 1956/57 level shown in the table.)

Current Route Charges in Other Countries

At present, no charges are imposed on international routes in Europe—except Ireland and Malta—or in the United States. It is interesting to note, however, that the air carriers in the United States are considering the present federal gasoline gross tax of 3¢ per gallon with a 1¢ rebate to the purchaser is their contribution to the upkeep of federal airways. And last January (1959) the President in his Budget Message for 1960 had said "The magnitude of the burden on the general taxpayers for rising airway expenditures makes it essential that users of the facilities pay a greater share of the cost. To this end, legislation will be transmitted to raise the effective tax on aviation gasoline from 2 cents to 4½ cents in 1960 and to levy the same tax on jet fuels, which are now tax-free."

Such proposal, if approved by Congress ". . . will increase general fund receipts by an estimated $85 million in fiscal 1960 and by somewhat larger amounts in subsequent years."

---

[2] Proceedings of the Route Facilities Charges Conference, Vol. I. Report and Working Papers of the Conference (1958).

[3] The Economist, Sept. 14, 1957, p. 862.

[4] Proceedings of the Route Facilities Charges Conference, Vol. II, Minutes (1958).

In Ireland, the telecommunication charges at Shannon Airport which are based on full cost recovery, amounted to £70,000 in 1957 compared to £50,000 in the previous year, when the charges were first introduced. To recover the full cost, the charges per flight at Shannon must vary depending on the number of flights; in 1957, it varied from $6.70 to $13.86 with an average of about $9.10/flight.

In many countries of Central and South America and Asia, the navigational facilities are operated by private companies, usually organized by the airlines themselves.[5] Sometimes these companies have taken over only the operating of the route facilities, leaving the ownership still with the Contracting States. Quite often the charges are imposed for each contact and although the rate per contact may look rather low, e.g. $1.50 on a long flight, the charge would be substantial, since over 50 contacts might be made.

In Australia—as in Canada, the navigational charges are combined with landing fees, but in Australia, the method of charging is more refined. This is done by having a standard rate multiplied by a factor allocated to each route.[6] In New Zealand, a route charge of $28 (£10) was imposed in April 1954, on any international take-off.[7]

By and large, when the navigational facilities are operated by a special organization which has been formed by airlines, the charges generally reflect the total cost to a much better extent than is the case of charges imposed by a government; an airlines' organization must base its charges on a full cost recovery, especially from the outside carriers who do not participate in operating the service, whereas a government organization can afford to accept a partial cost recovery.

Although the methods and rates in charging for international route facilities vary sharply from country to country, where such charges are imposed, this state of affairs is to be expected in view of the fact that airport charges even in the same country sometimes differ immensely; a survey of 136 United States' airports has revealed 151 different landing rates[8] (by contrast in Canada, all landing charges are standardized across the country).

To compare the Canadian international charges, we show on page 143 a sample of international landing- and route charges.

Route Costs in Different Countries

In Table 1, we summarize all costs of international air routes which have been submitted to the Conference by 23 countries out of a total of 70 ICAO members. But these 23 countries, as we shall see later on (Table 3a and 3) account for 79 per cent of the world's international air traffic reported to ICAO.

By and large, the cost of route facilities is related to the area of a country, and as these areas differ immensely, so the cost of air routes must differ too. However, we may notice in Table 1 that in European countries in general, and in France in particular, the international routes are relatively

[5] Among these, the most important are; Aeronautical Radio Inc. (ARINC) which was established in 1929 by a number of United States' airlines; International Air Radio Ltd., which originated in the U.K., and now provides navigational facilities in many parts of the world (Mediterranean area, East Africa, Burma, and Pakistan); Radio Aeronautica Mexicana (RAMSA), and in Peru, Corporacion Peruana de Aeropuertos Y Aviacion Comercial (CORPAC). The last two companies are controlled by their governments.

[6] There are two unit rates per 1,000 lbs. of aircraft gross weight; below and over 20,000 lbs. The route factors vary from 1 to 13, depending on distance, with a factor of 8 for each international landing and take-off.

[7] Manual of Airport and Air Navigation Facility Tariffs, Sixth Edition, Montreal 1958.

[8] Jaworski, The Effect of Standard Charges on Canadian Airport Operations, 21 J.A.L.C. No. 4 (1954).

A Sample of International Charges for Landings and Route Facilities

— 1957 —

NOTE: If a charge is related to aircraft's gross weight, a DC-6 of 93,200 lbs. is taken as an example.

Route Facilities Operated by:	Government		Special Companies		
	Canada	Australia	ARINC	CORPAC	RAMSA
Route:	London-Montreal	Melbourne-Brisbane	Vancouver-Cold Bay	Lima to Northern Peru and Santiago	Mexico City to Acapulco, Brownsville and El Paso
Distance (Stat. Miles)	8,242	887	1,710	1,310	1,319
	$	$	$	$	$
Charges:					
Total: Airport & Route					
—per flight	141.50	36.80	86.41	157.69	180.12
—per mile	.044	.041	.051	.120	.137
Airport (landing)	128.50[1,2]	36.80	14.91[4]	157.69[7]	5.12
Route Facilities:					175.00[6]
a. Navigational			71.50[5] =		
b. Telecommunication	13.00[3]		58.50 + 13.00		

[1] On a Montreal outbound flight to London, this charge would apply only at Gander if an aircraft lands there. Similarly, on an inbound flight from London, if a stop is made at Gander, this charge will be also imposed there in addition to a domestic landing charge of $23.50 made in Montreal. The charge refers to North-Atlantic crossings, i.e. no distance is specified. The charge increases with aircraft gross-weight —slightly more than proportionally.

[2] Does not include the departing passenger service charge at London of 5s./pass. levied by the airport management. On a load of 35 passengers, this charge would amount to $24.50. The international landing charge in London is $99.40.

[3] The charge is levied on each flight, i.e. is not related to distance or to aircraft's gross-weight.

[4] The corresponding landing charge at Vancouver amounts to $23.50.

[5] Includes an ARINC's navigational and telecommunication charge of $58.50, and the Canadian telecommunication charge of $13/flight. The ARINC's charge is based on a contact rate of $1.59 with an average of 36.9 contacts on this route. The charge is not related to aircraft's gross weight.

[6] Reflects cost of all navigational facilities which lie within 100 km. of the route. No relation to aircraft gross-weight.

[7] The charge is directly related to distance and increases with aircraft gross-weight—slightly less than proportionally.

much more expensive than on this continent. Admittedly, if we compare the recorded costs of Metropolitan France with those of West Germany in relation to their areas, the figure for France is only 7 per cent higher. On the other hand, if we refer the cost to the United States' area, the total international navigational cost for Metropolitan France would be almost 20 times as high. In the United States, only a very small proportion of the air routes' operating costs are allocated to international operations; in 1958 the total operating cost of the airways is estimated as $163.3 million[9] whereas in 1955 (see Table 1) only $5.2 million is shown. The latter figure, however, excludes the international facilities pertaining to the air traffic with Canada. In Metropolitan France, the costs of the international routes definitely represent a much higher proportion of all routes; a figure of 64 per cent was given for 1955, but it takes into account traffic with the French overseas territories.[10]

It was claimed by some delegates that the high cost of route facilities in Western Europe is caused by the overlapping of facilities in neighboring countries which, in turn, is due to military requirements. This is rather surprising, as it might have been expected that NATO—by stressing a unified command—would have tended to eliminate such overlapping. Finally, we cannot rule out the possibility that some significant discrepancies among the countries' route expenses may have to be traced to different accounting methods.

It is interesting to note in Table 1 that the cost of meteorological services is quite significant; it accounts for almost one-quarter of the total gross cost of air routes, and the figure may be raised up to 40 per cent if we include the weather vessels. The vessels in some instances played an active part in air rescue operations.[11] In the Canadian data, the meteorological cost figures are relatively under-estimated due to the fact that the radio transmission cost of met. information to aircraft is hidden in the cost of the Telecommunication Branch which is shown jointly with the Air Traffic Control in Column 3 of Table 1. Such transmission costs of met. data may exceed $0.4 million a year.

As underlined in the notes of Table 1, Joint Financing Arrangements with Denmark and Iceland are not included in the cost figures. Under this agreement, for the calendar year 1957, Denmark and Iceland received $1,172,799 and $1,022,734 respectively from the fourteen governments whose airlines cross the North-Atlantic above the 40th parallel. The contributing governments were assessed in proportion to the number of flights only, i.e. irrespective of the aircraft size. On that basis, Canada's share came to 3.76 per cent, with the United States leading the list with 42.1 per cent, trailed by the United Kingdom with 11.1 per cent, and the Netherlands, 10.7 per cent. As the total number of North-Atlantic crossings in 1957 approximately was 27,000, the assistance to the airlines by their governments appears to be of the order of $80/flight.

The revenues from the charges for route facilities which are recorded in Table 2 *do not change significantly the grand total of net costs,* but in some countries—Canada is one of them—the revenues are reducing the total costs by a substantial amount. And in an extreme case like Mexico, where the total cost reflects the contribution of the airlines and the expenses of the RAMSA organization, which operates for the government, it appears that there are no further burdens to Mexican tax-payers for assisting the operation of international air route facilities.

It is very unlikely that the countries will play the same role in inter-

[9] Schenkman, International Civil Aviation Organization, Librairie Droz, Geneva (1955).

[10] *Op. cit.* note 1.

[11] Schenkman, *op. cit.* note 9.

national air transport as carriers as is their contribution in providing route facilities for international air transport. This is illustrated by the last column of Table 1, where the share in net cost is shown in per cent of the sum of reported data to ICAO.

Therefore, it was quite apparent at the outset of the Conference that, by and large, the countries who are playing a more significant part as international carriers than as providers of international route facilities, would oppose a general introduction in the near future of user charges for international routes. And during the Conference, some of the delegates of these countries even went so far as to challenge the principle of charging for route facilities, claiming that the facilities are a safety device, the cost of which should be borne entirely by the state.

However, generally, it was fully recognized by the Conference that under Article 15 of the Chicago Convention, the preamble of which in fact is ICAO's Constitution,[12] the contracting states are fully entitled to impose charges on international carriers for airports and air navigational facilities, provided that the charges do not discriminate among the carriers and are not imposed solely for the right of transit or entry "of any aircraft of a contracting state" and providing that the charges are communicated to ICAO for publication. The Conference went so far as to say in its Final Report[13] that: "It was also agreed that there would be no objection to the provider making a profit out of charges for some facilities if other facilities were provided for the same users at a loss, or if the provider was attempting to recover losses made in the past. It was, however, felt that it would not be desirable for those providing route facilities and services for international civil aviation to have as a principal aim to set their charges at such a level that over the whole field and in the long period they would produce a net profit."

It logically follows—although it was not spelled out during the Conference—that a difference between the total cost and the total revenues from charges, which in Table 1, Column 7, we defined as "net cost," is in effect a subsidy in kind to the international airlines—a view heretofore expressed by Professor Lissitzyn.[14]

Distribution of Route Costs Among Airlines

The ICAO study, in its cost allocation of international route facilities to aircraft of different sizes, concluded that "simple straight-line relationship between weight and charge would seem to be best here as well as for airport charges (see Doc. 7462, C870, page 17)." The reference in brackets refers to ICAO's study of international airports.[15] It should be noted that in the quoted study (on page 18) the aircraft gross weight was emphasized not only as a proper index of cost allocation, but also as an index of the value of services rendered.

During the Conference, however, several delegates although admitting the aircraft gross weight as a criterion for airport charges, have challenged its validity for allocating route costs. In their view, route costs should be related only to the distance or flying time, because they found it hard to believe that one DC-7 would require the utilization of route facilities equivalent to about six DC-3's, as a route charge related to aircraft gross weight would imply. But, even when we admit that aircraft gross weight is not a good index for allocating route charges, it still remains as an index of value of service, or to put it differently, of the carrier's ability to pay. And the ability to pay, of course, is much smaller for a DC-3 operator, than for

[12] *Ibid.*
[13] *Op. cit.* note 2.
[14] Lissitzyn, Public Aid to Major Foreign Airlines, 18 J.A.L.C. (1951).
[15] International Airport Charges (ICAO) 1954.

a carrier in a DC-7 class. In practice, if a government decided to recover a fixed portion of its cost, and if the charges were to be imposed regardless of the aircraft gross weight, then some of the operators of smaller aircraft would be forced out of business, and it is obvious that for the remaining operators, the charges would have to be raised. As an illustration of how the unit charges must vary in a fixed cost recovery, we have already quoted the communication charges in Ireland. Only if a government decides to recover a substantial part of its costs, the decision as to whether or not to take into account aircraft gross weight is bound to be of practical importance in sub-dividing the country's route facilities between domestic and international operations. For example, in Canada, if we allocate the route cost to the trans-border movement of traffic in proportion to ton-miles flown, i.e. aircraft gross weight, the trans-border share would equal about 20 per cent of the allocated costs of the domestic operations, but if we allocate the cost on the basis of plane-miles flown, i.e. disregard the aircraft's size, the allocation to trans-border service would be only 10 per cent of the domestic share, or one-half of the previous amount.[16]

A Single Charge vs. A Composite Charge

The problem is whether the navigational charge should be quoted as one single charge, or as a composite charge incorporating several payments for the use of the various facilities and services. ICAO's survey, and a slight majority of the delegates during the Conference (including the Canadian delegate) favored a single charge as a more simple procedure. And even the supporters of a composite charge—with the United States as the main speaker—did not ask for a separate charge for each individual use of each individual facility or service. In their view, a separate charge should be established only if there is a significant difference in utilization of a particular facility. To the Conference's discussion, some personal comments may be added.

The 1956 survey of the arways' usage in the United States clearly indicated a wide gulf among the users with respect to the utilization of the control towers (partly an airport, and partly a navigational facility) and of fixed postings (which may be considered as a pure navigational facility). The air carriers, other civilian users, and the military accounted for control tower operations in the proportions of 30 per cent, 45 per cent, and 25 per cent respectively, whereas on fix postings, these three groups of users show a quite different distribution; 51 per cent; 6 per cent; and 43 per cent respectively.[17] But even when a single charge is imposed, these three major groups of users are usually taken into account for cost allocation. Actually, a practical meaning would appear only when we approach closely a level of full cost recovery, and not at the present stage when most of the providers of the facilities who have already imposed a charge are aiming at less than one-half of cost recovery. Admittedly, among the same group of users, the principle of a composite charge represents an ideal method from an accounting point of view. Apart from the administrative costs of fulfilling such an ideal in practice, a composite charge introduces an incentive for the unnecessary diversification of equipment or services, thus raising the cost, as they then must be distributed among a small number of users. And technically, a parallel usage of different equipment or facilities provided independently from a different source may endanger safety even when the absolute error of the equipment or facility is of the same order. To illustrate the diversification aspect among the scheduled carriers on the North-Atlantic, let us

[16] Compiled from the 1956 statistics, as published by the Dominion Bureau of Statistics.

[17] Osmun, Civil Aviation Faces Airways User Charges, Business Commercial Aviation, March 1958.

quote an example. TWA may claim a reduction of our oceanic landing rates, in view of the fact that to some extent these rates include the cost of Loran stations which facility TWA is not using at all, although all other major airlines do. Obviously, if we want to maintain our cost recovery at the same level, any reduction granted to TWA must be compensated by an increase of rates to other users. However, TWA's policy of not using Loran facilities is under sharp criticism even in the United States, where a Coast Guard spokesman told American Aviation: "TWA argues that they have to carry a navigator and he ought to earn his money."[18] Thus the reason for TWA not using the facilities seems to be—to say the least—rather unconvincing.

Regarding a cumulative error of facilities or services provided by different sources, we may refer to an interesting discussion in the United Kingdom at the Institute of Navigation about traffic control problems over the North-Atlantic. It was pointed out during this discussion that if two aircraft are using found winds or forecast winds from different forecast offices, they may converge just because they are making different allowances for windage and, therefore, for a given level of risk, the two tracks must be made to fly 120 miles apart. On the other hand, if these two aircraft are using forecasts from the same office, even if it is wrong, the courses followed by both aircraft will err in the same way, and consequently they are less likely to converge, and for the same level of risk, the separation may be reduced to 60 or 80 miles.[19]

Further Requirements

It was rather a pleasant surprise during the Conference that the delegates were told by IATA, which represents a majority of the international carriers, that no additional requirements for route facilities are anticipated solely for the forthcoming jet aircraft. And it was claimed that the jets may even decrease the cost of navigational facilities, as it would be advantageous to combine several small navigational centers into one unit, covering a large area. Furthermore, it was mentioned by some delegates that there is a possibility that a Doppler airborne equipment now under development may cut considerably the carriers requirement on navigational ground facilities. However, more recently in the United States Mr. M. Rogoff, Executive Engineer of the Federal Telecommunications Laboratories, has stated that:[20] "In all likelihood ground-based radio navigation aids will always be required to correct the inherent errors of these self-contained sensors."[21]

And even at the Conference, at the opening the Chairman of ICAO Air Transport Committee mentioned an additional expense of $3 million for the trans-Atlantic route to link traffic control centers by a forward scatter radio system or by a new submarine cable. According to our experts, Canada's share under the first alternative would amount to a capital cost of about $900,000 and yearly expenses of $85,000 for maintenance, plus $45,000 as a contribution to ICAO. Under the second alternative, which technically appears to be more reliable, the yearly cost of the cable usage would be of the order of $350,000. In short, despite the fact that there are no special requirements for the forthcoming civilian jets, in the next 2-4 year this

[18] Campbell, Electronics and Trans-Canada Air Lines, Can. Aero. Journal, May 1958.

[19] Frazer, Navigation and Traffic Control Over the North Atlantic, X Journal of the Institute of Navigation, No. 2 (1957).

[20] Rigoff, Radio Navaids for Long-Range Flight, 17 Aero/Space Eng., No. 5 (May 1958).

[21] Especially in areas with a high traffic density like the North-Atlantic, airborne Doppler would tend to reduce the existing separation standards rather than replace the present system of ground radio aids.

country will be faced with an additional cost on the North-Atlantic route of not less than $350,000. Regarding operators, Mr. C. J. Campbell, T.C.A., Director of Telecommunications, has made an interesting observation:[22] "I regret to say that in my some twelve years' association with civil aviation we have not removed one single communication of navigation service from the aircraft, although we have installed systems which are lighter and more compact than the original."

Conference Decisions

We have already made several references to the discussions during the Conference, the Final Report of which runs into 40 pages,[23] with several recommendations. The gist of the Conference appears to be clearly reflected in paragraph 24 of the Final Report which reads:

> "It seemed clear that no general statement could be made as to whether user charges for route facilities and services are desirable or undesirable in every case. Each State must decide for itself whether when and how such charges should be imposed. There were, however, a number of important practical considerations to be taken into account, of which the most important was that any substantial new charges imposed globally on the airlines in the near future might well have a serious effect on the financial position of international air transport, which was at present going through a difficult transitional stage. On these grounds a number of delegates were strongly opposed to the imposition of user charges in this field, at least for a considerable time. The majority of delegates, however, felt that the burden on a number of governments of providing these facilities and services free was becoming too great and that user charges must be regarded as being inevitable sooner or later in such cases. They should, however, be introduced gradually and progressively with careful attention to the resultant effects on the economy of international air transport."

This statement was agreed upon after a lengthy discussion by a majority of 16 to 7. There is, of course, a long list of administrative recommendations, from which we would like to quote the following:

—the charges should not be imposed in such a way as to discourage the use of facilities and services;[24]
—charges, wherever possible, should refer to the facilities provided by an appropriate ICAO Regional Plan, and should be revised with the plan accordingly;
—the Contracting States are responsible for a non-discriminatory route service even if the service is provided by a private organization.
—the carriers should be consulted directly or through their associations before any charges are imposed;
—three months' advance notice, if possible, should be given before the charges are put into effect;
—the Council should review the cost and revenues of international routes at intervals approximately three years, requesting for that purpose the necessary statistics on an *ad hoc* basis.

The Final Report—as authorized by the Conference—has been approved by the Vice Chairman, Dr. E. M. Loaeza, Chief Delegate and Representative of Mexico to ICAO.

PART II

Afterthoughts

As the cost of international route facilities—shown in Table 1—was provided by several countries, the question arises as to the usage of the

[22] *Op. cit.* note 18.
[23] *Op. cit.* note 2.
[24] By implication, this recommendation disfavors the navigational charges based on each contact.

international facilities to be distributed among the countries represented by their airlines. Therefore, in Table 3, we recorded for each country the international traffic data reported to ICAO by the airlines. And, to refer specifically to the countries which have submitted the costs of international routes to ICAO, in Table 3a, we omitted those countries where the information about the route costs is not available. By restricting the data in this way, we have still maintained in Table 3a, over 85 per cent of the grand total traffic reported to ICAO and shown in Table 3.

It may be concluded from Table 3 and 3a that for the countries with a significant amount of traffic, the traffic assessment as a percentage of the world's total does not change very much whether we refer only to the distance flown, i.e. plane-kilometers, or whether we make an allowance for the aircraft size by taking the available ton-kilometers as a basis for assessing traffic percentages. By and large, the reverse is true for those countries whose participation in international air transport is below one per cent of the world's total, as it appears that the cost allocation of route facilities on the basis of aircraft gross weight, i.e. available ton-kilometers, would favor those countries operating aircraft of a relatively small capacity. Therefore, in our proposal of cost allocation illustrated later on in Tables 4, 4a and 4b, we have chosen to refer to the available ton-kilometers flown.

If we relate the total Net Cost from Table 1 (which as we stated before could be called in a fact a subsidy) to the total amount of traffic indicated in Table 3a, we may conclude that the average net cost or subsidy per plane-kilometer and per available ton-kilometer is of the order of 5.7¢ and .93¢ respectively. It is difficult to say how these figures compare with the charges or costs imposed by private organizations of the airlines like ARINC who provide navigational facilities. A spot-check on the Vancouver-Tokyo route on the segment Vancouver-Cold Bay, with a distance of about 2,750 kilometers, where an average charge of $58.50 is collected by ARINC, indicates a rate of 2.1¢/kilometers, which is less than one-half of the average net cost or subsidy derived from Tables 1 and 3a.

The picture presented in Table 4 is self-explanatory; on the left side of the table we have grouped all the countries who provide international route facilities above the requirements of their own carriers and, conversely, on the right side, we show those countries whose carriers require more international facilities than the country's contribution to the provision of such facilities. Admittedly, the list of countries is not complete; for example, on the right side of Table 4, Switzerland is missing, which accounts for 2.34 per cent of the world's available ton-kilometers flown (see Table 3) but, whose contribution to the navigational facilities, if we consider the country's area—is likely to be lower than Norway's percentage, i.e. .81 (see Table 1).

To illustrate the derivations of the figures in Col. 3 of Table 4, let us take for an example the figure of $2·343,000 for Canada. This was obtained as a product of: (0.0982 — 0.0368) × 38,162,000, where the factors of 0.0982 and 0.0368 have been taken from Table 1 (Col. 8) and Table 3a (Col. 6) respectively. On the other hand, the figure for Belgium is shown on the right side of Table 4 as the product of (0.0147 — 0.0178) × 38,162,-000 = $118,000, has a negative sign. (The factors of 0.0147 and 0.0178 are taken from the Tables 1 and 3a, as before.)

It would be an over-simplification to say that all countries on the right hand side of Table 4 were at the Conference in opposition to the user charges, as among them was the U.K. who championed the idea that the decision about imposing user charges should be left entirely to the individual country. But looking in retrospect, the opposition to the user charges came from the group of countries shown on the right side of the table, and

conversely the advocates of the charges are grouped on the left side, despite the fact that Table 4, or its equivalent, was not presented at the Conference.

By implication, Table 4 introduces "a clearing house" idea with a built-in subsidy in kind by the Contracting States to their own airlines, with a maximum determined by the individual country's total navigational facilities provided for international air transport.

In other words, in order to reduce the global cost of navigational facilities, each country under the proposed clearing house idea would offer to the international transport cost-free an equivalent amount of route facilities as its own airlines are using in any part of the world. But some contracting States have not a sufficient amount of route facilities to render a full compensation. And to take only the deficit of such countries as a basis for assessing the route charges, is the crux of the proposed clearing house. The yearly deficit, which amounts to $18,776,000 (see Col. 4 of Table 4) if related to the international traffic of the national airlines of the States who account for it, indicates an uncompensated requirement of 3.6¢/plane-kilometer. It is interesting to note that for the Netherlands'- and the United States'- airlines, the additional requirements from other countries if related to the traffic, are of the same order; 4.5¢/plane-kilometer, which is above the average of 3.6¢ for all countries listed in Column 3. On the other hand, the U.K. airlines' additional requirement is only 1.6¢/plane-kilometer.

In the next step of our analysis which is illustrated by Table 4a, we relate the route cost to the countries which have been shown on the left side of Table 4, to the profit after income tax of the airlines belonging to the countries on the right side of Table 4. And surprisingly enough, the total profit of such carriers in 1956 was of the order of $29 million before income tax, which was more than ample to cover the adjusted costs (i.e. the costs scaled down by the usage of the country's own airlines) of $17.3 million. These results are quite contrary to the ICAO's conclusion based on the estimated global figures.

Admittedly, the coverage for the international air traffic in Table 4a is more restricted than in Table 4, as financial data for some of the airlines is not available to ICAO.

However, Table 4a accounts for 91 per cent of traffic data shown on the right side of Table 4a, which, in turn, reflects 87 per cent of the total airlines traffic (available ton kilometers flown) reported to ICAO and recorded in Table 3. Summing up, Table 4a still reflects about 79 per cent of the world's air traffic as compiled by ICAO.

Not too great emphasis should be placed on the full extent of the differences suggested by Table 4 and 4b, nor would any claim to a full comparability of the diverse sources of information, especially about the international route costs, be justified. On the other hand, any estimates about the global figures must not only carry all the errors embedded in the basic data underlying Table 4a, but must add new ones, as the airlines- and routes-cost data have to be extrapolated.

Finally, in Table 4b, an attempt was made to assess the impact on a country's economy of the "over-contribution"of international route facilities. Since we have referred to such a parameter as national income, where the figures are not fully comparable, we should consider the index in Column 4 of Table 4b as only very rudimentary and, therefore, differences between the countries' indices of the order of less than—let us say—30 to 50 per cent, cannot be considered as significant.

In our opinion—assuming that a significant cost recovery of route facilities is bound to happen in the near future—the corresponding burden that will fall on the international airlines could be lightened considerably, by

implementing the clearing house idea, as such device will shift almost one-half of the total cost of route facilities to the countries' governments in general whose carriers are active in international air transport, and in particular if these carriers are playing a leading role.

The successful implementation, however, of a clearing house presupposes three conditions:

(i) The airlines must provide initiative in the scheme, and cooperate efficiently.

(ii) The Contracting States must respond favorably to the airlines' initiative by providing information about costs and accepting suggestions in order to make their cost data comparable.

(iii) Rapid implementation of the scheme is essential, otherwise some Contracting States dismayed with the delay may impose charges at a higher level than would occur under a clearing house arrangement.

Obviously, the airlines could reduce still further the pending amount of user charges, by making constructive recommendations to the governmental agencies to save on expenses. And, in this respect, the airlines may refer to their own experience, including the experience of organizations established by them, e.g. ARINC, in operating navigational facilities and allocating costs among the users.

So much for the economic side. Now a few words for the organizational aspect of the problem.

The clearing house arrangement, of course, would not affect the ownership or operation of the navigational facilities. This would be regarded, as at present, to be a purely domestic question to be left to the decision of the individual states.

The clearing house could be sponsored within the ICAO framework by IATA, who initiated a similar facility for the airlines' accounts several years ago.

ICAO Regions in this respect would be all the more justified, than one organization on a world wide basis, because on a regional basis, the facilities of the Contracting States differ less than on a global scale, and what is even more important, there is a direct link between the providers and the users. From an accounting point-of-view, however, the overlapping boundaries of the Regions would impose some difficulties in allocating costs. In our final conclusion, we must admit that there is no political possibility of completely achieving an implementation of a clearing house on all international air routes in the whole world. But, it remains right, and realistic too, to cheer it on as far as it can go, because no useful purpose is going to be served by a request for a perfect global solution.

TABLE 1

COSTS OF ROUTE AIR NAVIGATION FACILITIES ALLOCABLE TO INTERNATIONAL AIR TRANSPORT

Source: Working Papers of ICAO Conference on Route Facilities Charges, Montreal 1958.

Notes: (1) Joint Financing Arrangements with Denmark and Iceland are excluded.

(2) Total Net Costs in Col. 8 below is the difference between Col. 6 and the revenues shown in Table 2.

(3) For interpretation of some of the figures see text.

(4) The cost of met. facilities shown in Col. 4 does not include the $13 million allocation of the jointly financed weather vessels in the North-Atlantic.

		(*Thousands of Dollars*)					
Country	*Year*	*Com. & Radio Aids and Air Traffic Control*	*Met.*	*Other Ancillary Services*	*Total Costs Gross*	*Total Costs Net*	*Percent of Total Net Costs*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
GRAND TOTAL		28,706	9,631	1,415	41,708	38,162	100.00
Argentina	1956	N.A.	N.A.	N.A.	1,585	1,287	3.37
Australia	1956/57	1,528	363	90	1,981	1,783	4.67
Belgium	1955	413	126	22	561	561	1.47
Canada	1956/57	2,788	1,429	936	5,153	3,749	9.82
China	1956/57	204	40	—	244	244	0.64
Denmark	1956/57	635	208	—	843	843	2.21
Finland	1956	386	234	—	620	620	1.62
France—Total	1958	8,371	4,186	—	12,557	12,557	32.90
a. Metropolitan		4,943	2,343	—	7,286	7,286	19.09
b. Overseas		3,428	1,843	—	5,271	5,271	13.81
Germany	1957	2,307	732	—	3,039	3,039	7.96
Ireland	1956/57	574	198	—	772	759	2.02
Japan	1954/55	406	49	—	455	455	1.19
Lebanon	1956	N.A.	N.A.	—	104	104	0.27
Mexico(3)	1957	1,018	157	—	1,175	0	0.00
Netherlands	1956	740	184	—	925	925	2.42
Norway	1955/56	258	50	—	308	308	0.81
Philippines	1954	342	—	—	342	342	0.90
Portugal	1951	547	—	—	547	547	1.43
Sweden	1956/57	453	168	—	621	621	1.63
U. of So. Africa	1956/57	172	51	—	223	223	0.58
United Kingdom	1956/57	3,655	83	367	4,105	4,105	10.76
United States	1955	3,845	1,343	—	5,188	4,730	12.39
Uruguay	1956	64	30	—	94	94	0.25
Viet Nam	1955	—	—	—	266	266	0.70

TABLE 2

REVENUES OF ROUTE AIR NAVIGATION FACILITIES ALLOCABLE TO INTERNATIONAL AIR TRANSPORT

Source: Working Papers of ICAO Conference on Route Facilities Charges, Montreal 1958.

Notes: (1) The revenues from the facilities jointly operated by the airlines such as ARINC; IAL; SITA and CORPAC, are excluded.

(2) In Australia, the revenues are assumed as 10 per cent of the total operating cost.

(3) Canada's revenues are estimated as one-half of the trans-oceanic landing revenues plus $319,327 derived from the telecommunication charges.

(4) In the U.S., the revenues are derived from Class B messages only.

(5) No data are available about New Zealand's revenues, where an international airways' charge of $28.00/take-off is collected.

Country	*Year*	*Revenues (Thousands of Dollars)*
(1)	(2)	(3)
GRAND TOTAL		3,547
Argentina	1956	298
Australia(2)	1956/57	198
Canada(3)	1956/57	1,404
Ireland	1956/57	13
Mexico	1957	1,175
United States(4)	1956	459

TABLE 3

INTERNATIONAL AIR TRANSPORT — REVENUE TRAFFIC

Calendar Year 1956

Source: The figures in Col. 3 and 5 below have been computed by adding the data of international revenue traffic of the individual airlines as shown by International Civil Aviation Organization, Digest of Statistics No. 65, Part IV.

Country of Airlines' Registration	*Number of Registered Airlines*	*Kilometers Flown*		*Available Ton Kilometers*	
		Total (000)	*Percentage of Total*	*Total (000)*	*Percentage of Total*
(1)	(2)	(3)	(4)	(5)	(6)
			%		%
GRAND TOTAL	112	779,911	100.00	4,723,987	100.00
Argentina	1	7,246	.93	34,045	.72
Australia	1	17,116	2.20	119,113	2.52
Belgium	1	15,668	2.01	72,912	1.54
Brazil	6	12,117	1.55	73,850	1.56
Canada	2	26,434	3.39	151,086	3.20
Chili	1	1,856	.24	10,927	.23
Ceylon	1	1,431	.18	7,258	.15
China (Taiwan)	1	4,474	.57	18,430	.39
Colombia	2	5,689	.73	44,388	.94
Cuba	1	3,330	.43	31,716	.67
Czechoslovakia	1	4,272	.55	8,330	.18
Denmark	1	12,243	1.57	78,724	1.67
Egypt	1	3,168	.41	10,666	.23
Ethiopia	1	3,576	.46	12,138	.26
Finland	2	4,021	.52	15,517	.33
France	4	43,868	5.62	281,965	5.97
Germany (Fed. Rep. of)	1	9,445	1.21	71,311	1.51
Greece	1	1,500	.19	5,005	.11
Iceland	1	1,166	.15	5,631	.12
India	1	9,469	1.21	69,893	1.48
Indonesia	1	1,345	.17	5,194	.11
Iraq	1	1,760	.23	5,490	.12
Ireland	1	6,440	.83	23,256	.49
Israel	1	4,241	.54	26,447	.56
Italy	2	13,588	1.74	76,212	1.61
Japan	1	5,493	.70	33,449	.71
Lebanon	3	6,865	.88	30,115	.64
Mexico	1	2,870	.37	18,556	.39
Netherlands	1	61,847	7.93	399,669	8.46
New Zealand	1	3,234	.42	17,729	.38
Norway	1	12,243	1.57	78,724	1.67
Pakistan	1	2,544	.33	11,145	.24
Philippines	1	689	.09	2,898	.06
Portugal	4	1,710	.22	6,137	.13
Spain	2	7,382	.95	39,907	.85
Sweden	1	18,364	2.36	118,089	2.50
Switzerland	1	22,070	2.83	110,403	2.34
Thailand	1	2,212	.28	8,461	.18
Turkey	1	677	.09	1,334	.03
U. of South Africa	1	5,483	.70	37,201	.79
United Kingdom	27	125,758	16.13	655,318	13.87
United States	23	275,879	35.37	1,851,832	39.20
Uruguay	1	1,349	.17	2,612	.06
Venezuela	3	7,779	1.00	40,904	.87

TABLE 3a

INTERNATIONAL AIR TRANSPORT REVENUE TRAFFIC OF COUNTRIES RECORDED IN TABLE 1

Calendar Year 1956

Source: International Civil Aviation Organization, Digest of Statistics No. 65, Part IV.

Country of Airlines' Registration	*Number of Registered Airlines*	*Kilometers Flown*		*Available Ton Kilometers*	
		Total (000)	*Percentage of Total*	*Total (000)*	*Percentage of Total*
(1)	(2)	(3)	(4)	(5)	(6)
			%		%
GRAND TOTAL	81	665,505	100.00	4,100,959	100.00
Argentina	1	7,246	1.09	34,045	0.83
Australia	1	17,116	2.57	119,113	2.90
Belgium	1	15,668	2.35	72,912	1.78
Canada	2	26,434	3.97	151,086	3.68
China (Taiwan)	1	4,474	0.67	18,430	0.45
Denmark	1	12,243	1.84	78,724	1.92
Finland	2	4,021	0.60	15,517	0.38
France	4	43,868	6.59	281,965	6.88
Germany (Fed. Rep. of)	1	9,445	1.42	71,311	1.74
Ireland	1	6,440	0.97	23,256	0.57
Japan	1	5,493	0.83	33,449	0.82
Lebanon	3	6,865	1.03	30,115	0.73
Mexico	1	2,870	0.43	18,556	0.42
Netherlands	1	61,847	9.29	399,669	9.75
Norway	1	12,243	1.84	78,724	1.92
Philippines	2	689	0.10	2,898	0.07
Portugal	4	1,710	0.26	6,137	0.15
Sweden	1	18,364	2.76	118,089	2.88
U. of South Africa	1	5,483	0.82	37,201	0.91
United Kingdom	27	125,758	18.90	655,318	15.98
United States	23	275,879	41.45	1,851,832	45.16
Uruguay	1	1,349	0.20	2,612	0.06

TABLE 4

ADJUSTED COSTS OF INTERNATIONAL ROUTE AIR NAVIGATIONAL FACILITIES

Note: The calculations in this table are based on the data shown in Tables 1 and 3a.

Col. 2 below is the product of the positive differences of Col. 8 of Table 1, and Col. 6 of Table 3a, multiplied by the Grand Total Net Cost of $38,162,000 from Table 1.

Col. 4 below, conversely, is the product of the negative differences of Col. 8 of Table 1 and Col. 6 of Table 3a, multiplied by the Grand Total Net Cost of $38,162,000.

Some example for calculation of Col. 2 and Col. 4 are given in the text.

The discrepancy between the grand total of Col. 2 and Col. 4 is due to rounding of figures.

(*Thousands of Dollars*)

Countries who are providing more route facilities than the international requirements of their airlines	*Yearly Excess of Facilities Cost*	*Countries who are providing less route facilities than the international requirements of their airlines*	*Yearly Excess of Usage Cost*
(1)	(2)	(3)	(4)
	$		$
GRAND TOTAL	18,785		18,776
Argentina	969	Belgium	118
Australia	675	Lebanon	176
Canada	2,343	Mexico	160
China	72	Netherlands	2,797
Denmark	111	Norway	424
Finland	473	Sweden	477
France	9,930	Union of South Africa	126
Germany	2,374	United Kingdom	1,992
Ireland	553	United States	12,506
Japan	141		
Philippines	317		
Portugal	488		
Uruguay	72		
Viet Nam	267		

TABLE 4a

INTERNATIONAL AIR TRANSPORT AIRLINES FINANCIAL DATA AND ADJUSTED COSTS OF NAVIGATIONAL FACILITIES OF THE COUNTRIES SHOWN IN COL. 3 OF TABLE 4

Calendar Year 1956

Notes: Airlines Financial Data are restricted to those recorded by ICAO Digest of Statistics No. 66.

Col. 6 below is the adjusted Col. 4 of Table 4, in relation to the traffic shown in Col. 4 of this table to traffic data of Col. 5 of Table 3a.

In adding costs of the Scandinavian countries in Col. 6, Denmark's data from Table 4, Col. 2, were taken with a minus sign.

Country of Airlines' Registration	*Airlines—International Operation*				*Adjusted Costs of Excess Usage of Nav. Facilities*
	Number	*Av. Ton Kilometers 000's*	*Total Expenses*	*Profit After Income Tax*	
			Thousands of Dollars		
(1)	(2)	(3)	(4)	(5)	(6)
GRAND TOTAL1	9	3,043,231	786,111	29,035	17,287
Netherlands	1	402,080	100,474	6,061	2,814
Norway, Sweden, Denmark	1	277,719	74,459	2,027	796
United Kingdom	2	614,972	192,777	1,520	1,869
United States	15	1,748,460	418,401	19,427	11,808

TABLE 4b

INTERNATIONAL AIR TRANSPORT ADJUSTED COST OF NAVIGATIONAL FACILITIES OF THE COUNTRIES SHOWN IN COL. 1 OF TABLE 4 AND ITS RELATION TO THE NATIONAL INCOME

Calendar Year 1956

Note: Country's national income shown in Column 4 was calculated from the United Nations' Statistical Yearbook of 1957, pages 483, 484, 494-496.

Countries who are providing more route facilities than the international requirement of their airlines	*Yearly Excess of Route Facilities Cost (Thousands of Dollars)*	*National Income (Millions of Dollars)*	*Yearly Excess of Route Facilities Cost ÷ 1/1,000,000 of National Income*
(1)	(2)	(3)	(4)
Argentina	969	7,728	125
Australia	675	10,302	66
Canada	2,343	24,009	98
China	72	2,657	27
Denmark	111	3,690	30
Finland	473	3,773	125
France	9,930	39,971	248
Germany	2,374	35,000	68
Ireland	553	1,285	430
Japan	141	20,631	68
Philippines	317	4,168	76
Portugal	488	1,694	288